

AN ADDITIONAL NEW SCALE WORM
(POLYCHAETA: POLYNOIDAE) FROM THE
HYDROTHERMAL RIFT AREA OFF
WESTERN MEXICO AT 21°N

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Abstract.—A unique polychaete, *Branchiplicatus cupreus*, n. gen., n. sp., from the hydrothermal vent area at 21°N off western Mexico is described and referred to a new subfamily of Polynoidae, Branchiplicatinae. Branchiae are well developed and of an unusual type. The prostomium is truncate, rather than bilobed, as is usual in the Polynoidae.

This is the fourth contribution dealing with the unusual polynoid polychaetes collected from hydrothermal vents off the Galapagos and on the East Pacific Rise off western Mexico at 21°N (Pettibone 1983, 1984a, b). The polynoids described herein were collected by the OASIS group of Scripps Institution of Oceanography during four *Alvin* dives in April–May 1982 in 2612–2633 meters at 21°N. They were a part of the numerous polynoid polychaetes sent to me by J. F. Grassle and I. Williams of the Woods Hole Oceanographic Institution (WHOI). The specimens were retrieved from washes of other invertebrates, including the vestimentiferans *Riftia pachytila* Jones, 1981, the giant clams *Calyptogena magnifica* Boss and Turner, 1980, and the ampharetid polychaetes *Alvinella pompejana* Desbruyères and Laubier, 1980. Other described polynoids collected from some of the same dives include *Lepidonotopodium fimbriatum* Pettibone, 1983, and *L. riftensis* Pettibone, 1984b. This is the second branchiate species of Polynoidae to be described from the hydrothermal vent areas, the first being *Branchipolynoe symmytilida* Pettibone, 1984a, commensal in the mantle cavities of the Galapagos deep-sea vent mussels.

The types are deposited in the National Museum of Natural History, Smithsonian Institution (USNM). This is OASIS Expedition Contribution number 25.

Family Polynoidae

Branchiplicatinae, new subfamily

Branchiplicatus, new genus

Type-species.—*Branchiplicatus cupreus*, new species. Gender: masculine.

Diagnosis.—Body elongate, flattened, tapered posteriorly, segments up to 35, first achaetous. Elytra and elytophores 12 pairs on segments 2, 4, 5, 7, 9, 11, 13, 15, 17, 19, 21, and 23. Dorsal cirri on non-elytra-bearing segments, with short cirrophores and long styles. Branchiae well developed on segments posterior to segment 2, of unique type formed of elongate folded sacs with ciliated bands and attached by broad base to lateral sides of flattened elytophores and of dorsal tubercles on cirriferous segments. Prostomium truncate anteriorly, not bilobed, fused to tentaculophores of first or tentacular segment, with long median antenna

and pair of long palps; without lateral antennae or eyes. Tentaculophores without setae, with 2 pairs of tentacular cirri; without facial tubercle. Second or buccal segment with first pair of elytra, biramous parapodia and long ventral buccal cirri. Parapodia biramous, both rami with projecting acicular processes and numerous long, copper-colored setae. Notosetae much stouter than neurosetae, smooth or with double rows of spines. Neurosetae of 2 types. Ventral cirri short. Pharynx with 5 pairs of unequal papillae; 2 pairs of jaws with edges minutely denticled. Without distinct segmental ventral papillae.

Etymology.—*Branchi*, from *branchia* (Greek) gills, plus *plicatus*, from *plicatus* (Latin) fold, referring to the unusual type of folded branchiae. The specific name *cupreus*, from *cuprum* (Latin) copper, referring to striking copper-colored setae.

Branchiplicatus cupreus, new species

Figs. 1–4

Material examined.—Pacific Ocean off western Mexico, 20°50'N, 109°06'W, OASIS *Alvin* dives in 1982: Dive 1214, 20 Apr, 2633 m, vestimentiferan wash, holotype (USNM 97219) and 21 paratypes (11 young; USNM 97220–2, 97226).—Dive 1219–10A & B, 25 Apr, 2612 m, *Riftia* and *Calyptogena* wash, fine fraction, 2 paratypes (USNM 97223).—Dive 1221–15, 4 May, 2618 m, *Riftia* and *Calyptogena* wash, coarse fraction, 1 young paratype (USNM 97224).—Dive 1226–7, 10 May, 2616 m, *Riftia*, *Calyptogena* and *Alvinella* wash, paratype (USNM 97225).

Description.—Length of holotype (USNM 97219) 50 mm, width with setae 15 mm, segments 35, last one small. Length of paratype (USNM 97221) 45 mm, width 19 mm, segments 34. Length of small paratype (USNM 97223) 13 mm, width 6 mm, segments 31. Body elongate, flattened ventrally, slightly arched dorsally, tapering slightly anteriorly and more so posteriorly (Fig. 1). No color but with striking long copper-colored setae.

Prostomium truncate anteriorly, extending posterolaterally and fused to tentaculophores of first or tentacular segment (Fig. 2A). Median antenna with ceratophore attached to middle of prostomium, with long tapered style; palps stout, long, tapered; without lateral antenna or eyes. Tentaculophores without setae, with 2 pairs of long slender tentacular cirri, dorsal ones subequal in length to palps, ventral ones slightly shorter (Fig. 2A). Tentacular segment not visible dorsally, forming upper and lateral lips of ventral mouth (Fig. 2A, B). Second or buccal segment with first pair of bulbous elytraphores, elytra, biramous parapodia, and long ventral buccal cirri similar to tentacular cirri and attached on bulbous cirrophores on bases of neuropodia lateral to lower lip and ventral mouth (Fig. 2A, B, G; 3A). Large muscular eversible pharynx with 5 pairs of papillae around opening, median pair longer with tapered tips, adjacent lateral pairs similar in shape but shorter, and lateral pairs shorter, rounded (Fig. 2D, E). Two pairs of large dark jaws with edges serrated or minutely denticled (about 20 teeth; Fig. 2E, F). Subdistally, pharynx with diagonal rows of small papillae on dorsal, ventral and lateral surfaces.

Elytra 12 pairs, on segments 2, 4, 5, 7, 9, 11, 13, 15, 17, 19, 21 and 23, with dorsal cirri on non-elytra-bearing segments, including up to 12 posterior segments. Elytra (Figs. 1; 2G, H; 4C) large, oval, covering dorsum except for posterior segments. Elytra stiff, smooth, opaque, with “veins”; first pair of elytra on segment

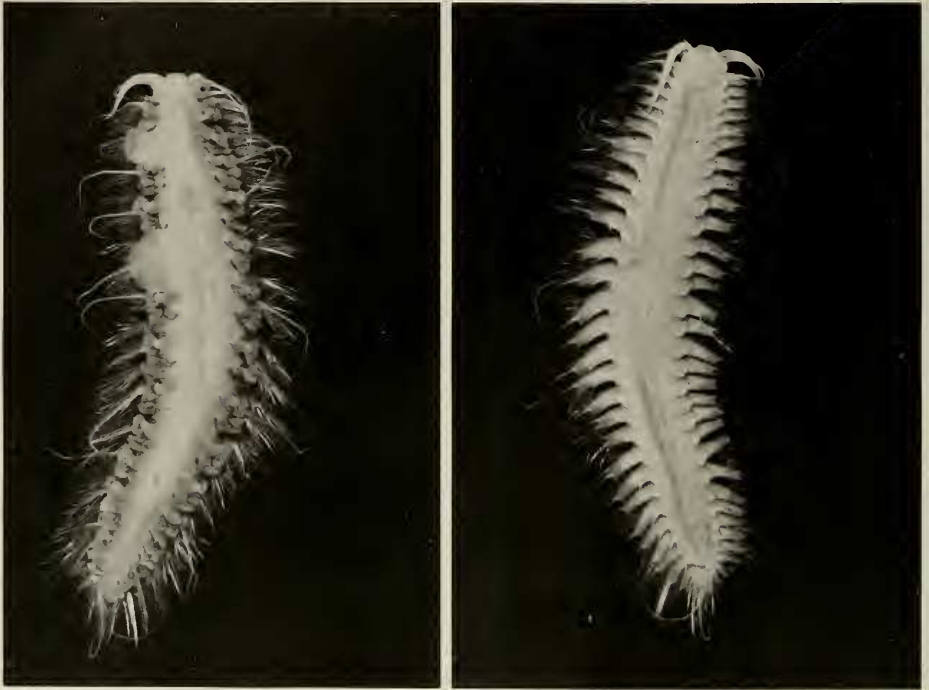


Fig. 1. *Branchiplicatus cupreus*, paratype, USNM 97220: Dorsal view, left; ventral view, right; only 2 elytra remain. 2 \times .

2 with anterior notch (Fig. 2G); posterior 12th pair on segment 23 elongate-oval, covering several posterior smaller segments (Fig. 4C). Posterior border of elytra with variable number of small round tubercles not sharply set off surface (Fig. 2G, H); elytral surface with minute sensory papillae. On small paratype (USNM 97223), tubercles scarcely demarcated and lacking on first and last pairs (Fig. 4C).

Elytrophores, from segment 4 on, flattened, directed posterolaterally, with flattened extensions on anterior and posterior sides, and with branchiae attached on lateral sides (Figs. 2C; 3D). Dorsal tubercles, corresponding in position to elytrophores on cirriferous segments, also flattened, with anterior and posterior extensions, and with branchiae attached on lateral sides (Figs. 2C; 3B, C; 4A).

Branchiae begin on segment 3 and continue posteriorly (Figs. 2A, C; 3B-D; 4A). Branchiae of unique type, formed of flattened elongate sacs, deeply folded and convoluted, attached by broad bases to lateral sides of elytrophores and dorsal tubercles and to dorsal sides of notopodia and dorsal cirrophores; surfaces of branchiae with transverse ciliated bands. Branchiae on elytriferous segments with extra lobe on posterior side; branchiae on cirriferous segments formed of equal-sized anterior and posterior flattened sacs fused basally.

Parapodia biramous (Figs. 3A-D; 4A). Notopodia shorter than neuropodia, rounded, with projecting acicular process on lower side and with short bract on anterior side. Cirrophores of dorsal cirri cylindrical and fused on lower side to anterior notopodial bract; styles of dorsal cirri long, slender, extending far beyond setae (Figs. 3B, C; 4A). Notosetae numerous, forming radiating bundles, short to

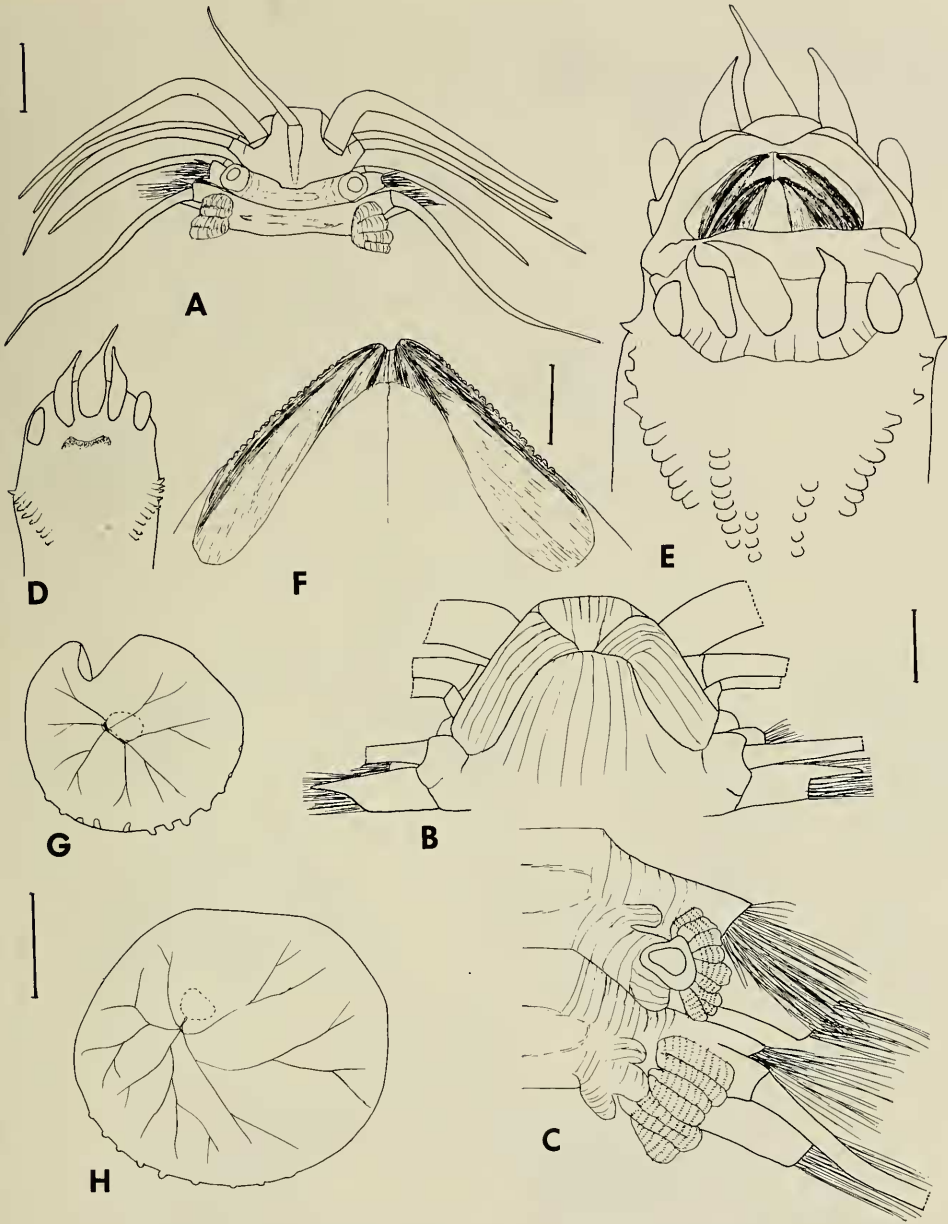
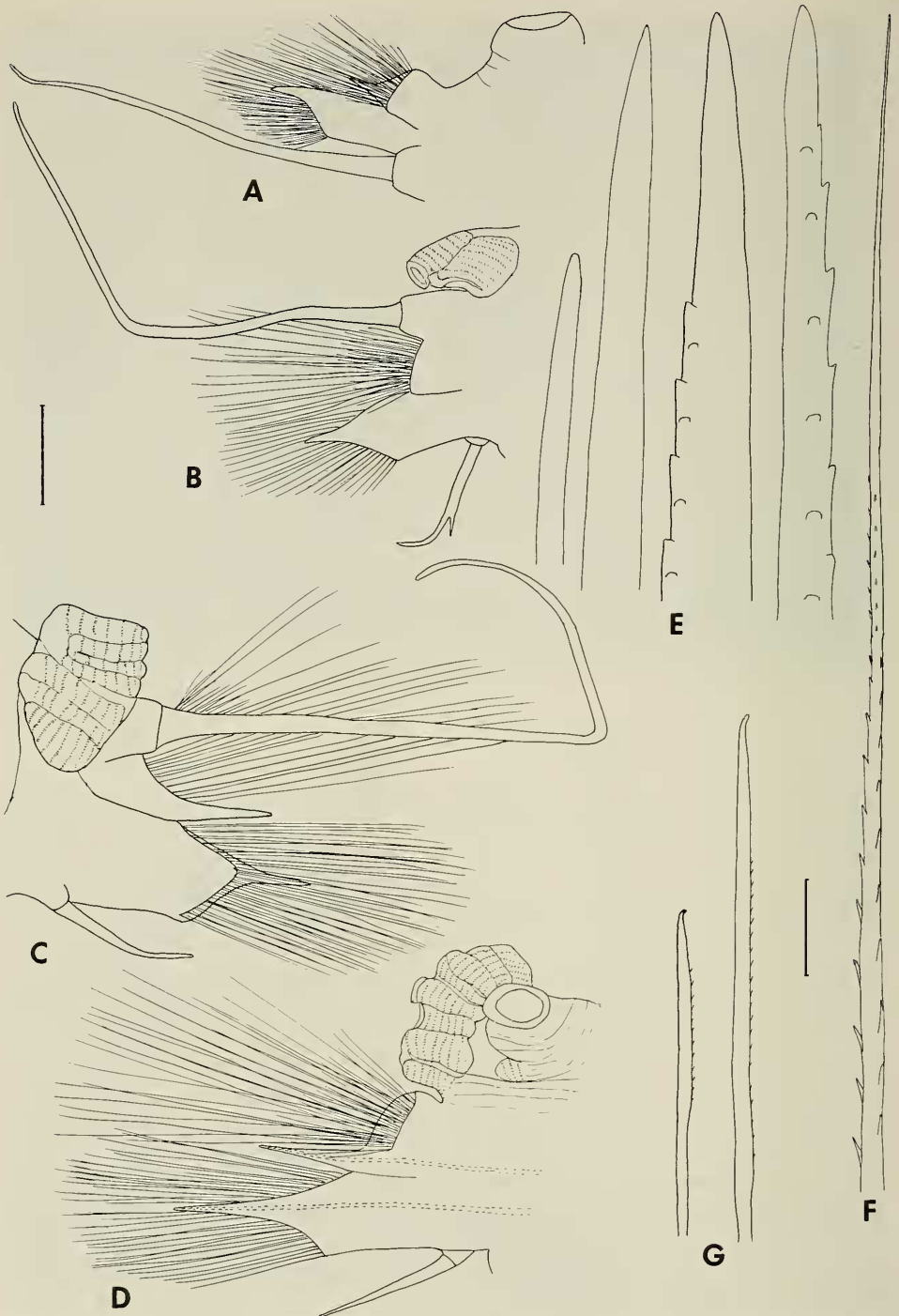


Fig. 2. *Branchiplicatus cupreus*, A–C, holotype, USNM 97219; D–H, paratype, USNM 97221: A, Dorsal view anterior end; B, Ventral view anterior end, bases of palps and cirri only shown; C, Dorsal view right parapodia of segments 11 and 12; distal end of style of dorsal cirrus not shown; D, Dorsal view anterior end of extended pharynx; E, Ventral view of same; F, Dorsal jaws; G, First left elytron (segment 2); H, Left elytron 6 (segment 11). Scales = 2.0 mm for A, D; 1.0 mm for B, C, E; 0.5 mm for F; 2.0 mm for G, H.

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Fig. 3. *Branchiplicatus cupreus*, paratype, USNM 97221: A, Right elytrigerous parapodium segment 2, anterior view; B, Right cirriferous parapodium segment 3, anterior view, ventral cirrus with



abnormal split tip; C, Right cirriferous parapodium segment 14, posterior view; D, Right elytriferous parapodium segment 15, anterior view, acicula dotted; E, Four short and long notosetae; F, Supra-acicular neuroseta; G, Middle and lower subacicular neurosetae. Scales = 1.0 mm for A-D; 0.1 mm for E-G.

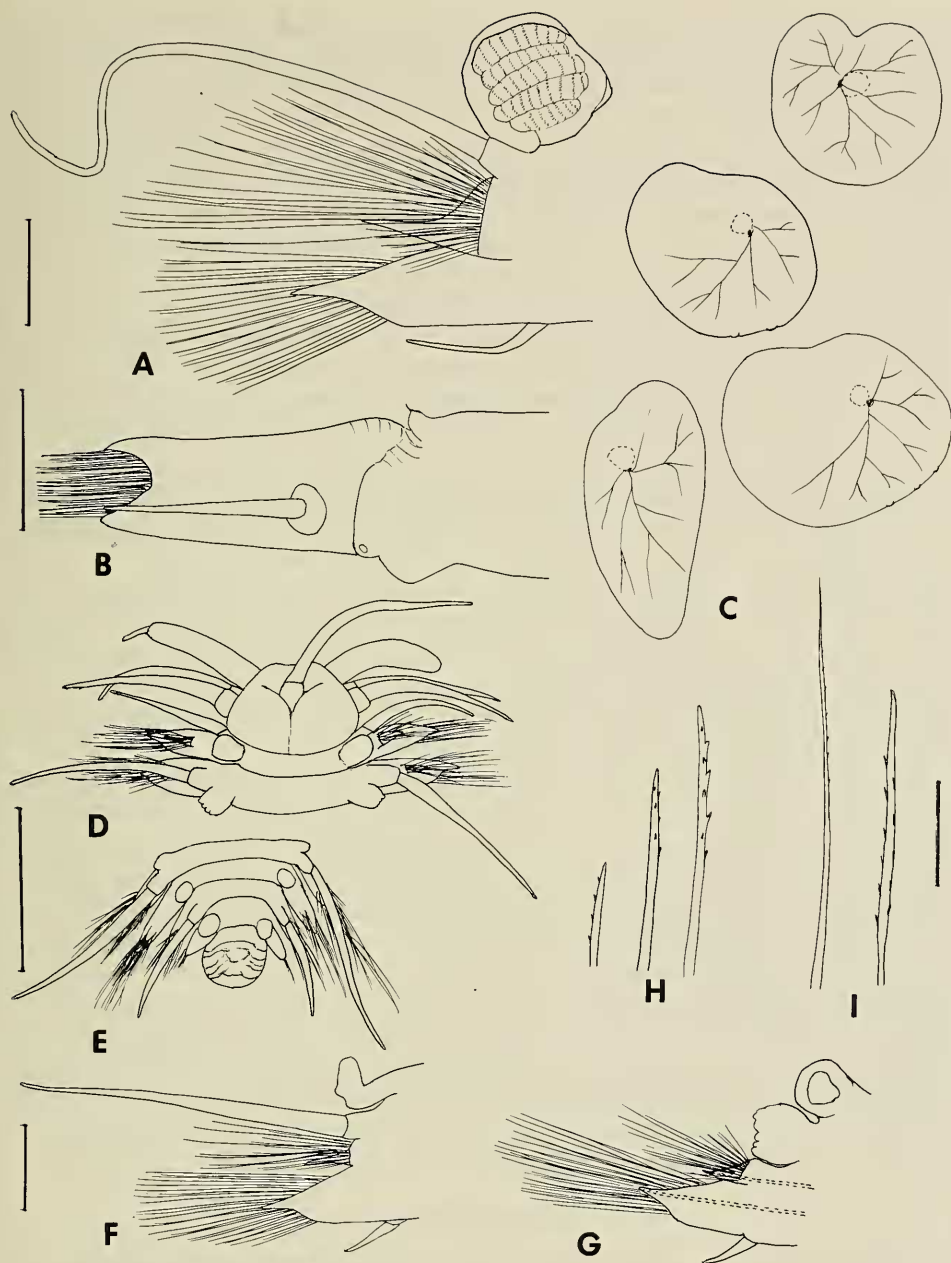


Fig. 4. *Branchiplicatus cupreus*, A, B, paratype, USNM 97221; C, small paratype of 31 segments, 13 mm long, USNM 97223; D–I, young paratype of 15 segments, 2.5 mm long, USNM 97222: A, Right cirriferous parapodium segment 25, anterior view; B, Ventral view of left parapodium segment 20 showing nephridial opening; C, Right 1st, 2nd, 6th and 12th elytra (segments 2, 4, 11, 23); D, Dorsal view anterior end, elytra missing; E, Dorsal view posterior end; F, Right cirriferous parapodium segment 8, anterior view; G, Right elytrigerous parapodium segment 9, anterior view, acicula dotted; H, Three short and long notosetae; I, Upper and lower neurosetae. Scale = 1.0 mm for A, C; 1.0 mm for B; 0.5 mm for D, E; 0.2 mm for F, G; 0.1 mm for H, I.

long, some as long as neurosetae. Notosetae numerous, forming radiating bundles, short to long, some as long as neurosetae. Notosetae much stouter than neurosetae, acicular, smooth or with double rows of spines near distal bare tips (Fig. 3E). Neuropodial presetal lobes conical, with projecting acicular process; postsetal lobes shorter, rounded. Neurosetae very numerous, slender, forming fan-shaped bundles. Supra-acicular neurosetae with 2 rows of prominent spines, tapering to long bare capillary tips (Fig. 3F). Subacicular neurosetae more slender, with shorter spines and slightly hooked bare tips (Fig. 3G). Ventral cirri short, tapered (Fig. 3B–D).

Dorsal anal ridge and anus enclosed in branchiae and parapodia of few posterior segments (32–35). Small rectangular ventral pygidium between parapodia of segments 34 and 35, with pair of long anal cirri (sometimes one short or both missing). No distinct nephridial or segmental papillae but ventral bases of neuropodia somewhat inflated with slightly projecting opening (not always visible; Fig. 4B).

Young paratypes (USNM 97226) ranging in size from 5 mm in length, 3 mm in width, with 19 segments, last 2 very small, to 1 mm in length, 1 mm in width, with 10 segments plus growing region. Young paratype (USNM 97222; Fig. 4D–I) of 15 segments plus growing zone, 2.5 mm long, 2 mm wide, with 8 pairs of elytophores (elytra missing). Developing flattened branchiae beginning on segment 3 (Fig. 4D–G). Prostomium with slight anterior notch, instead of truncate; palps cylindrical, with terminal filament, instead of tapered; median antenna closer to anterior end (Fig. 4D). Parapodia similar in shape to adults (Fig. 4F, G). Notosetae of same type but more slender (Fig. 4H). Neurosetae also more slender; lower ones with more prominent spines (Fig. 4I).

Remarks.—The unique folded type of branchiae in *Branchiplicatus* separates the genus and subfamily from the other subfamilies of Polynoidae. The presence of branchiae is an unusual feature in the Polynoidae, as mentioned in the description of *Branchipolynoe symmytilida* in Branchipolynoinae (Pettibone 1984a). In the latter group the well-developed branchiae are arborescent, rather than of the unique type in *Branchiplicatus*. The truncate, rather than bilobed prostomium also sets *Branchiplicatus* apart in the Polynoidae. There appears to be a greater fusion of the prostomium with the first or tentacular segment. The pharynx also differs from the other subfamilies in having five pairs of unequal papillae and two pairs of large serrated jaws. Branchiplicatinae agrees with the subfamilies Macellicephalinae, Lepidonotopodinae, and Branchipolynoinae (Pettibone 1976; 1983; 1984a) in having prostomia with median antenna only and lacking lateral antennae, but in these subfamilies, the prostomium is bilobed, rather than truncate.

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Literature Cited

- Boss, K. J., and R. D. Turner. 1980. The giant white clam from the Galapagos rift, *Calyptogena magnifica* species novum.—*Malacologia* 20(1):161–194.

- Desbruyères, D., and L. Laubier. 1980. *Alvinella pompejana* gen. sp. nov., Ampharetidae aberrant des sources hydrothermales de la ride Est-Pacifique.—*Oceanologica Acta* 3(3):267–273.
- Jones, M. L. 1981. *Riftia pachytila*, new genus, new species, the vestimentiferan worm from the Galapagos rift geothermal vents (Pogonophora).—*Proceedings of the Biological Society of Washington* 93(4):1295–1313.
- Pettibone, M. H. 1976. Revision of the genus *Macellicephalo* McIntosh and the subfamily Macellicephalinae Hartmann-Schröder (Polychaeta: Polynoidae).—*Smithsonian Contributions to Zoology* 229:1–71.
- . 1983. A new scale worm (Polychaeta: Polynoidae) from the hydrothermal rift-area off Western Mexico at 21°N.—*Proceedings of the Biological Society of Washington* 96(3):392–399.
- . 1984a. A new scale worm commensal with deep-sea mussels on the Galapagos hydrothermal vent (Polychaeta: Polynoidae).—*Proceedings of the Biological Society of Washington* 97(1):226–239.
- . 1984b. Two new species of *Lepidonotopodium* (Polychaeta: Polynoidae: Lepidonotopodinae) from hydrothermal vents off the Galapagos and East Pacific Rise at 21°N.—*Proceedings of the Biological Society of Washington* 97(4):849–863.

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